PIBS 2485

LARGE SCALE PRODUCTION OF AEROBIC COMPOST AT SCOTT'S COMPOSTING FARM

DECEMBER 1993

Ontario

Ministry of
Environment
and Energy

ISBN 0-7778-0843-9

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Report prepared by:

Scott's Composting Farm
and
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ACKNOWLEDGEMENT AND DISCLAIMER

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ABSTRACT

Scott's Composting Farm is located in Milton, Ontario in the Regional Municipality of Halton. The eighteen acre site is part of a one hundred and fifty acre farm owned by W.S. Scott.

Scott Farms is a third generation working farm which specializes in U-pick strawberries and raspberries. Sweet corn, asparagus, rhubarb, pumpkins and Christmas trees are all grown on-site. There is a retail outlet located on-site for the sale of bakery and grocery products.

To be successful in the highly competitive grocery market it was necessary for Scott Farms to differentiate their products by introducing organic growing methods. This method of growing has become increasingly popular and upon investigating markets the opportunity suggested that this was the best method for positive growth and prosperity. As part of an organic process there is a need for easy access to cost effective, healthy compost. A test pile was started, from waste generated on-site, at the farm during the summer of 1990.

From that test pile it was established that there was an opportunity and a need to include other and additional materials. This need determined that Scott Farms would create a separate company, Scott's Composting Farm.

Upon investigating various types of composting processes it was determined that a "windrow" system would be the most cost effective system to begin with. Applications were filed and a fully engineered site was built. Several changes to the site, the mix, the size of the rows, the turning process and the levels of heat and air were all regularly tested and modified if necessary.

The farm accepts materials from various sources; haulers that collect mainly from grocery chains, recyclers who bring in wood and food wastes from shopping malls and some office complexes, and food manufacturers/processors who deliver aged or off-spec materials. From these materials a mixture is created to strive towards the highest quality finished compost possible.

In the last twelve months Scott's Composting Farm has diverted over 13,000 tonnes of material that would have been destined to local landfill sites. Sixty percent of the incoming tonnage is converted to product and forty percent is lost to biodegration and moisture loss.

Scott's Composting Farm has been a very successful project and every effort is being made to expand and advance the composting process. The following report details the process, the equipment and the tonnages.

INTRODUCTION

On July 4, 1990, an application was submitted to the Ministry of the Environment. This original application was for the development of a four acre area to process 10,000 tonnes of outside organic material into compost, a quarter of which would be used by the farm. A Provisional Certificate of Approval was issued by the Ministry, October 22, 1990.

By December of the same year a request for changes to the original Certificate of Approval were submitted by Scott's. These changes included a request to increase capacity to 30,000 tonnes annually, allowing the site to be open 300 days per year and a request for the ability to accept additional waste products was also included.

On September 12, 1991, The Regional Municipality of Halton gave its approval subject to Scott's addressing the issues of odours, leachate, litter, vermin and compost quality. The Ontario Ministry of the Environment issued as Provisional Certificate of Approval A210516 which approved the following:

- use of the site for composting leaf and yard waste, food wastes, tobacco stocks, gypsum paper, mineral and food additives and wood chips;

- capacity of 100 tonnes per day and 30,000 tonnes total per year.

Requirements outlined included the following:

- grading of the site to provide adequate site drainage with no leachate or surface water and run-off to leave the area;

- increasing the proposed size of the holding pond to contain a minimum of one million gallons;

- submitting a plan on how the leachate and run-off from the site will be handled and disposed;

- submitting contingency plans for the control of odour, dust, vermin and litter.

In response to requirement Scott's has:

- installed and expanded a concrete pad to ensure that leachate and site run-off drains into the leachate holding pond;

- continued experimentation with aeration and mixing of the leachate pond to lower biological oxygen demand (BOD) thereby improving both water quality and odour;

- developed a plan to add aeration trenches to the windrow concrete pad to ensure sufficient oxygen to promote aerobic reaction. This system should speed up the composting process and help minimize odour problems which may originate from food wastes;
- developed plans to build a receiving building which along with a new grinder will enable a quicker preparation of the waste product mix for windrow composting.

On September 24, 1990 an application was submitted to the Waste Management Branch of the Ministry of the Environment, for a grant under the Industrial Waste Diversion Program, (IWDP).

PURPOSE

The principals of Scott Farms recognized a source of secondary material that through some form of processing could be both servicing their needs and the needs of surrounding generators of compostable materials.

The main purpose of this project was to supply Scott Farms with a healthy compost to be used for the organic growth of their fruits and vegetables.

JUSTIFICATION

Scott Farms is both a generator and a user of finished compost material. Expansion of the project will maximize local diversion efforts. To reach targeted diversion percentages, compostables are a major portion of the waste stream that must be addressed.

TECHNOLOGY USED

The system implemented was the windrow method. Material was placed in rows approximately 75 m long, 4 m wide and 2 m high.

Material is turned by a specially designed windrow turner. Daily records are kept in accordance with the Ministry of the Environment's, "Interim Guidelines for the Production and Use of Aerobic Compost in Ontario".

Alterations to the site included grading, rolled concrete, gravel and a pond, etc.

ENVIRONMENTAL BENEFITS

All produce is now organically grown, all byproducts (spoiled goods) from the farm are recovered as useful compost. Several tonnes of material from outside sources previously landfilled is now being recovered.

The application to the IWDP included detailed information on the proposed type of equipment to be used. Many changes were made in this area and details of existing equipment are stated later in this report.

A letter was received by Scott Farms stating that their application was being reviewed and any purchases made from the date of the letter would be considered under the approval process.

As purchases and quotes of equipment was made continual updates were sent to the Ministry of the Environment, Waste Management Branch.

Approval of the grant request was received by Scott's Composting Farm, September 1991.

The Scott's Composting operation has been a continual learning process that has proven to be extremely successful. The assistance of the Ministry's Grant has allowed the ability to finance purchases and expansions and their confidence in the project has been greatly appreciated.

THE PROJECT

THE COMPOST PROCESS

Raw materials for the process consist of the following main groups;

- select paper waste, free of contaminants and free of inks with heavy metals
- yard waste and leaves, grass clippings, small trees and clean wood
- food wastes from chain stores, fruit markets and single source generators (food processors)

All materials are weighed-in at the site and dumped in a mixing area. This area is located in a far corner of the site. The name of the hauler and the generator are both recorded. Loads are visually inspected for consistency, contamination and possible liquid leachate in the transport container. Unacceptable material is loaded back into the containers. Companies are charged for the additional labour to reload material.

Oversized materials and wood are loaded into a tub grinder and ground up. Raw material from the three main groupings, noted above, are mixed together in predetermined amounts and placed in triangular shaped windrows with a front-end loader. These windrows average 2 m high, 4 m wide and 75 m long.

Once the windrows are established, they are mixed approximately three times to assure a uniform product. The windrow system is aerobic and therefore needs oxygen to support the bacteria life. All windrows are turned at least once per week in summer using the specialized turner built for this purpose. In the spring and fall the frequency of the turning may decline to every two weeks and in winter to every four weeks, thereby ensuring that the windrows reach the optimum temperature for the composting process.

After ten to twelve weeks the compost is moved to a curing area where it is turned less often and allowed to cool. The final product is then screened, with the fines sold and the coarse material recycled back into the process to be further composted.

Temperatures are monitored on a regular basis to make sure that the process is maintaining a constant composting rate. Moisture levels are also checked to maintain a minimum level of thirty-five percent. Water may be added to cool the material in the summer months to help maintain an ideal temperature of 60 to 65 degrees celsius in the piles.

Leachate from the windrows, as well as, any water run-off from the site will run into a collection pond. Tests on the leachate are run for nitrogen compounds, heavy metals and pesticides. If water quality is satisfactory, surplus water can be pumped out to irrigate the farm, if not, water from the pond is pumped back onto the windrows. Water in the pond is also checked for biochemical oxygen demand (BOD). Every effort must be made to ensure that the pond does not become stagnant to control odours. A complete aeration system for the pond is being tested and introduced.

Finished compost is also tested for nitrogen compounds, heavy metals and pesticides. The compost is graded accordingly. Compost that is free of heavy metals and pesticides is classed as grade #1 and may be mixed with soil and used for growing product for human consumption. Other grades are mixed with soil and used as landscape material.

To minimize odours, high moisture, perishable waste materials are mixed with bulking agent type products, such as paper and wood and placed in windrows as soon as possible.

Vermin on-site has not been a problem. Litter also has not been an issue, any loose paper or plastic is picked up on a regular basis.

Berms are being erected along the north and west sides of the site to improve aesthetics. A natural stand of trees along the south side of the site serves a similar purpose.

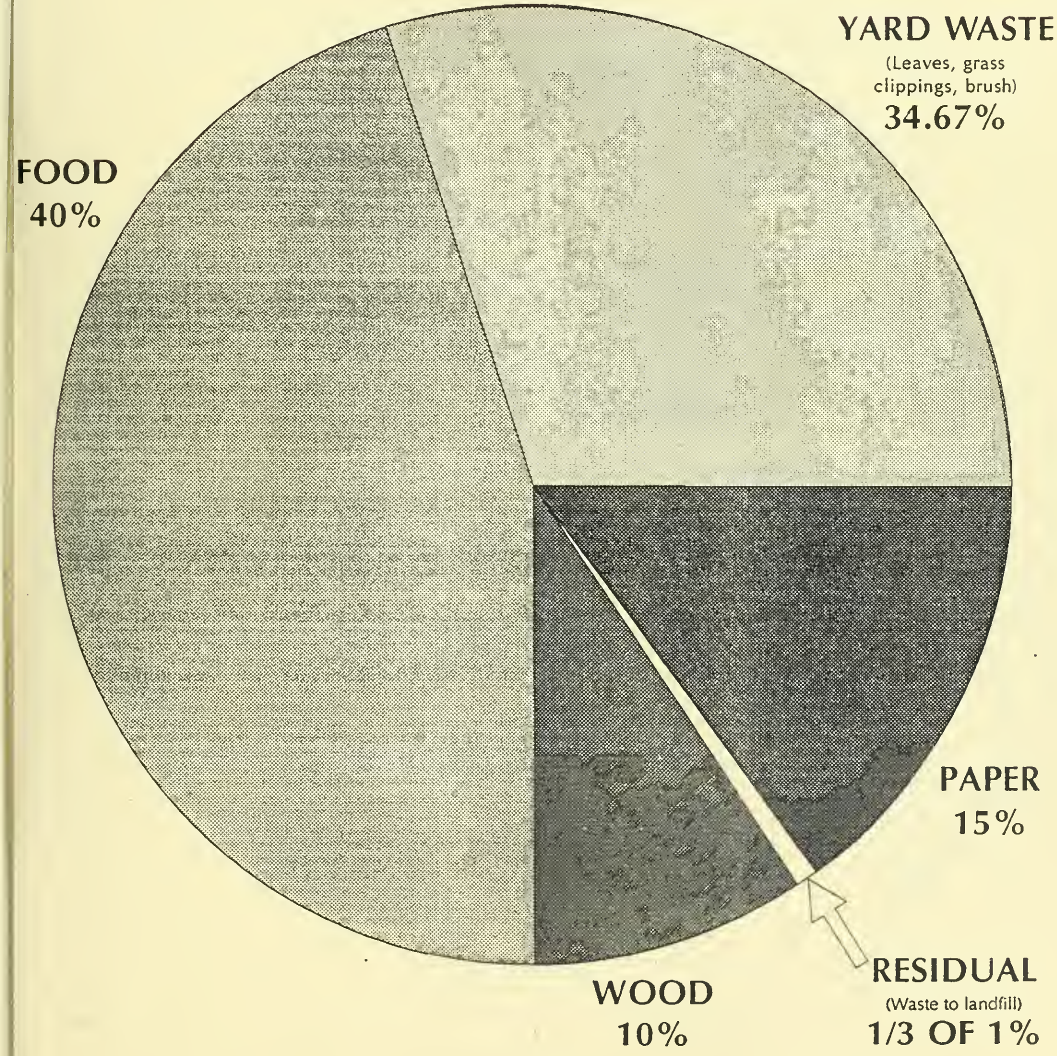
Customers supplying material include haulers (grocery store material), regional, city and town locations (yard and leaf material), recycling operations (wood waste), food processors (apple pulp) and small local landscaping business (brush).

The bulk of finished compost is being used on the organic farm, the balance is being sold to a topsoil company that has become a partner in the finished compost portion of the operation. The topsoil firm occupies the northern half of the eighteen acre site, where they screen, mix and store finished compost, topsoil and sand.

There are four full-time and one part-time employees at the composting site.

We expect to further expand the process and advance the technology to allow for increased throughput of organic wastes along with continual improvement of quality of the finished product.

INCOMING MATERIAL MIX



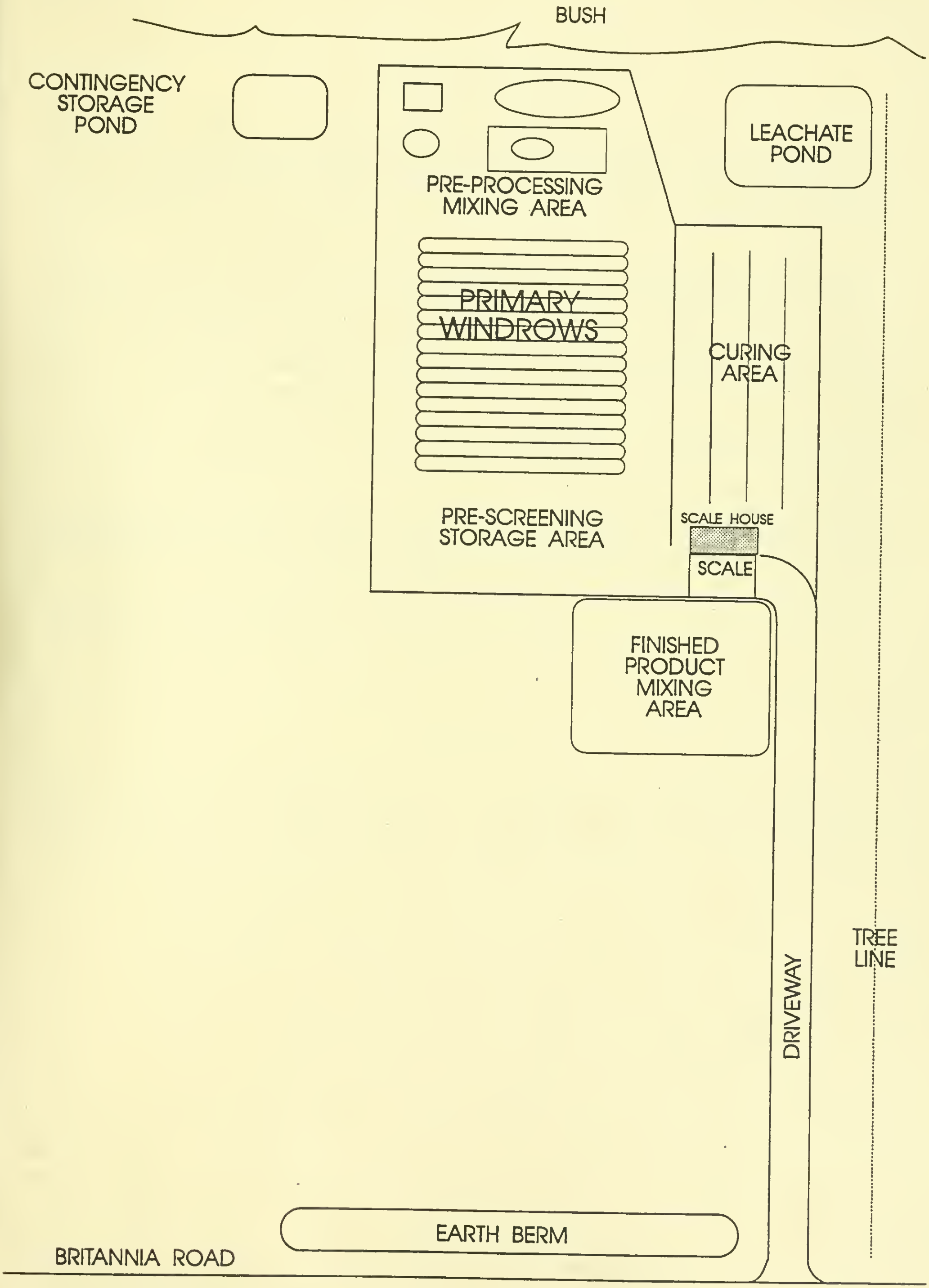
THE EQUIPMENT AND SITE ENHANCEMENTS

Scott's purchased and installed the following equipment and site enhancements as part of the project:

- a truck scale to weigh all incoming waste material;
- a four acre roller compacted concrete pad upon which the windrows are built and turned, a full engineering report was prepared to ensure the success of the concrete base;
- a grinder and two loaders for grinding and mixing of bulky wood material;
- a made to order customised windrow turner was built for the site;
- miscellaneous equipment to aerate the leachate pond and control the moisture in the windrow piles; and,
- the site was upgraded by adding gravel, placing a trailer as an office and upgrading and extending power on the site.

EQUIPMENT LIST

1) 40' Modular Active Truck Scale - model UMG 600;
2) 2 - 2 1/2 yd Michigan Centre Articulating Model 1-7 Rubber Tired Loaders;
3) Innovator Tub Grinder (325 hp) Model ATG - 2000;
4) Self Propelled Windrow Turner (18 ft. drum) Model 718;
5) 8 unit Pond Aeration System, Aero - 2;
6) 3 - 10 hp Blower Windrow Aeration System, Model - Caldwell C27-1035.


BUSH
CONTINGENCY STORAGE POND
LEACHATE POND
PRE-PROCESSING MIXING AREA
PRIMARY WINDROWS
CURING AREA
PRE-SCREENING STORAGE AREA
SCALE HOUSE
SCALE
FINISHED PRODUCT MIXING AREA
DRIVEWAY
TREE LINE
EARTH BERM
BRITANNIA ROAD

PROJECT ECONOMICS

All equipment and site enhancements have been purchased by Scott's Composting Farm. Second hand and specially designed products were sought and purchased wherever possible. Almost all equipment is Canadian made.

Scott's Composting Farm charges a reduced tipping fee for source separated loads of material. These dollars account for seventy-five percent of the money coming into the site. For this reason Scott's feels that it is very important for municipalities to keep their tip fees high. This will assist local projects like the composting farm by encouraging companies to source separate and direct their compostable materials to the farm.

The other twenty-five percent of revenues comes from the sale of finished product. The majority of this is used on the Scott Organic Farm.

The growth and acceptance of both the project and the product by industry has allowed for terrific growth of the site. The site has been continually advancing its systems and process to maximize throughput and guarantee a high quality product.

SUCCESSES

The major success of the program is not just the finished compost, which is an excellent product, but the opportunity to educate. Scott's is hoping that people will feel so positive about the composting process that they will take the opportunity to become compostors at home or that they will be willing to source separate their organic materials.

Several tours have been conducted where teachers and school groups have come on-site to view the process. They have been impressed by the compost process.

CHCH channel 11, a Hamilton station, has been at the site twice to report on the process. Jim Scott has been invited to speak to several groups about composting and the changing lifestyle on the farm.

A second success is the number of outside dollars invested because of the composting site. Several millions has been spent by customers for the purchase of additional containers, sealed vehicles and recovery bins. Over 50 new jobs have been created to service generators of compostable materials.

Last, but not least is the success of our finished compost. Companies are requesting our compost faster than we can prepare it and they have all been thrilled with the quality.

FAILURES

The one and only failure of note to report is the odour problem which has been an ongoing battle to contend with. The extremely wet summer of 1992 contributed to a few fragrant days and continued efforts are being made to rectify this situation.

RESULTS AND CONCLUSIONS

The main result of this project is that Scott's Composting Farm has diverted over 13,000 tonnes of compostable material in the last 12 months. Details of quantities diverted by month and the amount of prepared material can be found in the attached appendices.

Scott's has created a useful product from waste material and has done this in a clean and cost efficient manner.

Scott's has seen their customers invest over 2 million dollars to equip generators with the ability to source separate material. Over 50 new jobs have been created within the industry to service and handle compostable materials.

The main conclusion is that due to the success of the location enhancements must be made to move material through faster. System changes are required to meet both the demand of waste to be delivered and the increasing demand for finished product.

DO'S

- work closely with the local municipality to achieve a mutually cooperative situation;

- keep your neighbours informed and updated as to any changes or expansions being made to the site;

- cooperate with your local Ministry of the Environment office;

- keep up to date and concise records of all materials incoming and outgoing;

- make sure there is a complete monitoring process in place to ensure the quality of your finished product.

DON'TS

- make sure that there are confirmed markets for both material to be received and to be sold;

- keep neighbouring properties uninformed about what is happening in their neighbourhood.

APPENDIX A

THE PROJECT IN REVIEW

MONTH TO MONTH PROGRESS DETAILS

SEPTEMBER '90
- Grant request is made to the Ministry of the Environment

OCTOBER
- Scott's Composting Farm receives its certificate of Approval.

NOVEMBER
- First material arrives. the pond is completed and the office and scale are in place.

FEBRUARY '91
- Scott's Composting Farm is incorporated.

MARCH
- A loader arrives on-site for trial.

APRIL
- The grinder for oversized material and wood is purchased.
- Incoming material volume greatly increases.

JUNE
- The loader is purchased and the windrow turner arrives.

JULY
- With some minor adjustments and changes the turner works.

AUGUST
- Gypsum material is inventoried to mix with the expected increase of food wastes.

SEPTEMBER '91
- IWDP grant request is approved by the Ministry of the Environment.
- Jim Scott travelled to Edmonton and Grand Prairie to investigate sites with the proposed Rolled Compacted Concrete (RCC). The decision was made that this was the way to end current turner problems, where it was getting bogged down in wet clay.
- The site was then prepared for the installation of RCC.
- The truck scale was hit by lightening requiring repairs.
- Prepared compost was spread on Scott's Organic Farms.

OCTOBER	- RCC was poured. - Canadian Portland Cement Association put on an open house, visited by officials from the Department of Transport, the Ministry of the Environment and private construction companies. - Started to receive waste from Halton Hills. - Channel 11 news prepared a feature on the success of Scott's Composting Farms. - Tour for Metro Works personnel.
NOVEMBER	- Discussed an opportunity with a donut chain on the possibility of a trial with coffee grounds and old donuts. - A.A.A. Recycling started bringing food waste from shopping mall food courts and office buildings.
DECEMBER	- Turner required the installation of new seals and hydrostatics. - Channel 11 news is on-site again to feature Scott's. - Introduced our Christmas Tree gift/return program. Trees were offered to major customers, both generators and haulers, with the promise of pick-up after Christmas for composting. This project was a great success.
JANUARY	- Additional testing of product was started at Woods End Research Lab in Maine. - Christmas trees delivered from Halton Hills.
FEBRUARY	- A nomination was submitted to the Recycling Council of Ontario for the composting site, for the Waste Minimization Awards. - Tested and tried a screening system, purchase was not made. - Received updated Certificate of Approval.
MARCH	- First cheque from the Ministry was received. - Discussed receiving cafeteria waste from several local hospitals. - Started receiving Select Disposal material from a large grocery chain.
APRIL	- Second required loader arrives allowing for increased movement of material. - New employee hired.
MAY	- A small aeration system for the pond was developed and installed. - Shaft on turner drum broken and was replaced with larger diameter unit.

JUNE	- Purchased specialized flat windrow aeration pipe from the McReily Group in Minnisota. - Set-up a low horsepower fan blowing air through a pile of compost using the aeration pipe. The goal was to test and record the effect on temperature and odour.
JULY	- Toured the Resource Conservation Services location in Maine. Viewed their aeration system. - Explored four different types of grating systems for the ability to blow air up into the piles.
AUGUST	- Started our first full size 2.5 m and 5 m wide piles, designed with complete aeration system with temperature controls for the windrows. - All incoming food wastes were pre-ground prior to being placed into the windrow piles.
SEPTEMBER	- Changed raw material mix ratio for more pile porosity (added more bulky dry material). - Started large scale above grade test for the aeration of curing piles.

APPENDIX B

WASTE TONNAGES RECEIVED

MONTH	METRIC TONNES	
NOV. '90	12.75	
DEC.	13.76	
JAN. '91	48.01	
FEB.	33.01	
MAR.	187.16	
APR.	562.82	
MAY	546.46	
JUNE	709.35	
JULY	472.47	
AUG.	518.42	
SEPT.	479.00	
OCT.	750.55	
NOV.	652.63	
DEC.	364.00	
JAN. '92	512.76	
FEB.	491.25	
MAR.	742.35	
APR.	1,153.59	
MAY	1,289.50	
JUNE	1,239.11	
JULY	1,622.19	
AUG.	1,478.64	
SEPT.	1,354.55	
OCT.	1,374.98	
NOV.	1,382.50	sub '92 13,005
	17,991.21	

APPENDIX C

PRODUCT DISTRIBUTION

FINISHED COMPOST	METRIC TONNES	
Scott Farm use	3,540	
other farm use	300	
direct sales	1,850	
inventory (screened)	750	
	6,440	*

MATERIAL IN PROCESS	METRIC TONNES
inventory (in process)	2,499
screened overs (to be re-introduced into process)	1,808
residual to landfill (plastic 3/10 of 1% by volume)	48
	4,355

TOTAL 10,795

* NOTE : 60% of incoming tonnage is converted to product 40% is lost due to biodegration and moisture loss.

For more information on how you can participate in our Educational Tours please contact:

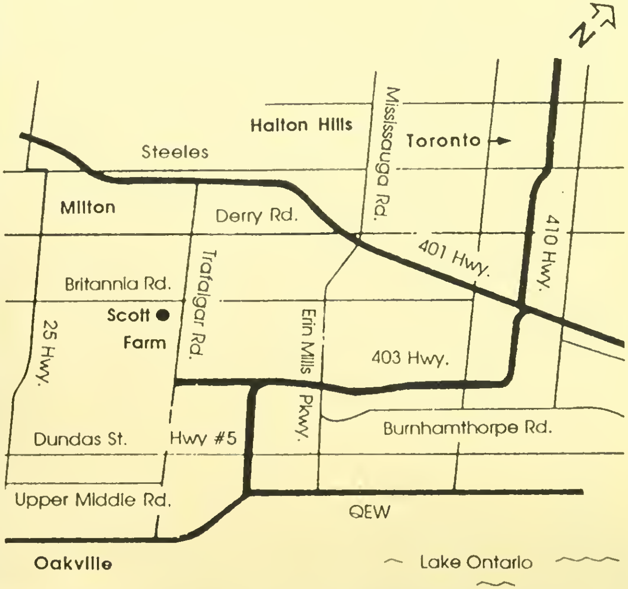
Stephen Laidlaw, Tour Representative

Scott's Composting Farm Inc.

280 Britannia Road, R.R. #1
Hornby, Ontario, Canada L0P 1E0
Tel: 1 (800) 267-3040 Fax: 1 (416) 875-4714

How to find us

Scott's Composting Farm is located just south-west of Britannia Road, on Trafalgar Road.



SCOTT'S
Composting
FARM
TOURS

SCOTT'S COMPOSTING FARM

What is a Composting Farm?

A Composting Farm is a wonderful new approach to waste management. We divert waste products from landfill sites and produce a wonderful, black fertile soil in approximately 15 weeks.

Scott's composting accepts yard waste such as grass clippings, leaves and brush as well as other recyclable organic material, such as hardwood skids and select paper. They also compost an array of Food Processor by-products such as cereal products, fruit and vegetable trimmings.

All of these things are put through a giant grinder, mixed together and then placed in 200-foot wind-rows to compost for 15 weeks, becoming a rich, black, fertile soil which is then sold to home-owners, landscapers, golf courses, and used on the farm itself to enhance its farming operation.

We are speeding up a natural process that *Mother Nature would take years to do.* This very innovative method is now diverting up to one-third of what would normally become landfill waste.

SCOTT'S COMPOSTING FARM

SCHOOL TOURS

Scott's Composting Farm is now offering school tours for all age groups. Tours are available from January 10th to June 30th and September 10th to December 10th.

For groups visiting our composting farm we offer a comprehensive tour developed in conjunction with Ontario Agri-Food Eduation Inc. and their popular *Agriculture In The Classroom* program.

Tours show students some of the latest and most enviromentally positive methods of diverting compostable waste from landfill sites. Students are taken into our composting *school* for some *hands on experience* with various types of soil. Here, they can also conduct their own soil experiments, and take the results home. They will also learn the various types of composters that are suitable for home use. Students are then given a wagon-ride tour around the farm to see the results of composted soil on farmland.

Scott's Composting Farm is a positive example of private enterprise co-operating with the community in education and solving some of society's waste managment problems by producing a truly rich and useful, recycled product — natural soil.